

METHODS FOR PRESERVING STRAINED SEMICONDUCTOR SUBSTRATE LAYERS DURING CMOS PROCESSING

ABSTRACT

Oxidation methods, which avoid consuming undesirably large amounts of surface material in Si/SiGe heterostructure-based wafers, replace various intermediate CMOS thermal oxidation steps. First, by using oxide deposition methods, arbitrarily thick oxides may be formed with little or no consumption of surface silicon. These oxides, such as screening oxide and pad oxide, are formed by deposition onto, rather than reaction with and consumption of the surface layer. Alternatively, oxide deposition is preceded by a thermal oxidation step of short duration, e.g., rapid thermal oxidation. Here, the short thermal oxidation consumes little surface Si, and the Si/oxide interface is of high quality. The oxide may then be thickened to a desired final thickness by deposition. Furthermore, the thin thermal oxide may act as a barrier layer to prevent contamination associated with subsequent oxide deposition.